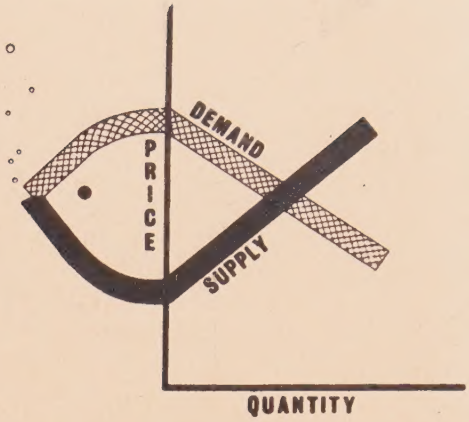

ELEMENTS CRUCIAL TO THE FUTURE OF ALASKAN COMMERCIAL FISHERIES

By

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(continued on inside back cover)

FOREWORD

The following report was prepared in response to a request from the University of Alaska. This report contains information on:

A. Domestic demand for human consumption and/or industrial use of Alaksa species

   1. Volume of demand in terms of expected U. S. economic conditions for next decade

   2. Estimated price range to compete in or remain on U. S. markets

   3. Trends for each species or group in terms of product forms, i.e., fresh, frozen, canned, blocks, industrial, by-products, FPC, etc.

   4. Market location, i.e., midwest, southwest, etc.

B. Foreign (export) potentials for Alaska species or groups

   1. Country

   2. Product form and volume

   3. Price at various levels

C. Factors affecting economic potential for each Alaska species or group. If possible, what are the two or three most significant factors that would stimulate a market for the latent resources, i.e., vessels, more efficient gear, change in processing technology, import quotas or tariffs, etc.

As a frame of reference, whenever possible this information relates to the following list of established, developing and

latent fisheries available to Alaskan fishermen.

	(MSY, thousand short tons)
A. Established fisheries	
1. Salmon	100-250
a. Chums	
b. Cohos	
c. Kings	
d. Pinks	
e. Socheye	
2. Shellfish	200
a. Shrimp	
b. Crab	
(1) Dungeness	25
(2) King	85
3. Halibut	60
B. Developing fisheries	
1. Shellfish	
a. Scallops	?
b. Tanner crab	100
C. Latent fishery resources	
1. Flatfish	
a. Yellowfin sole	2,000
b. Rock sole	1,360
c. Arrowtooth flounder	815
d. Flathead sole	345
e. Dover sole	205
f. Alaska plaice	?
g. Other sole and flounder	?
2. Rockfish	
a. Pacific Ocean perch	1,380
b. Other rockfish	?

3. Roundfish

a.	Walleye pollack	1,690
b.	Pacific cod	265
c.	Sablefish	30
d.	Other roundfish (cod)	?

4. Marine fishes

a.	Herring	500
b.	Other marine fishes (such as saury, squid, smelt, etc.)	?

5. Shellfish

a.	Clams	25
b.	Other (such as mussels, sea urchins, sea cucumbers, brittle stars, sea stars, etc.)	?

6. Freshwater species

a.	Dolly Varden (arctic char)	?
b.	Whitefish	?
c.	Lake trout	?

This report is not intended to be exhaustive. The authors have attempted to assemble readily available information and rapidly apply a broad base of available knowledge. In certain portions modern data processing techniques assisted in the application of statistical techniques, the end product being analytical results heretofore unavailable for many of the species indigenous to Alaska. As the product of slightly more than one man-month's effort this report is suggestive of appropriate direction for future inquiry rather than a definitive resolution of the issues considered. Considering the futuristic nature of the use of Alaska's resources this is not entirely inappropriate.

A. Domestic demand for human consumption and/or industrial use of Alaskan species

1. Projected volume of demand

Market potential analysis for Alaskan fish resources is done in the framework of the total U. S. market demand for each of the products from these resources. The share of this market obtainable by Alaskans is dependent on the comparative costs of harvesting, including foreign, and marketing by area. Sufficient information does not exist to make projections for all species, so in some cases species groups, and product groups are the unit of analysis. In the past, production of some peculiarly Alaskan products, e.g., king crab, has changed so rapidly, both in consumption and production, that it is impossible to get any meaningful statistical estimate of market potential. In such cases, demand relationships for close substitutes are used as the best available means of projecting the market for these species.

The products under analysis are divided into two groups, (1) those which supply can be expanded, and (2) those which are near or at maximum sustainable yield according to available information. The reason for the division is that for the first group, it is relevant to ask what factors will cause consumption to increase, whereas for the second this question is not relevant. Those in the group which have reached MSY are salmon, halibut and king crab. The other species are in the first group. King crab is not treated separately in the analysis which follows. The market for all crab

is found to be expanding significantly, and therefore, it is only a question of resource availability of the species.

To estimate the market potential for the first group, a set of equations was fit to the following general equation, using annual data from about 1950 to 1967. Variations on this equation were made by species according to statistical and economic tests of the results.

$$\frac{C}{N} = f\left(\frac{P_w}{CPI}, \frac{Y}{CPI}, \frac{CPI_{mpf}}{CPI}, \frac{P_s}{CPI}\right)$$

where

C = total U. S. consumption of the product

N = U. S. resident population

P_w = wholesale price of the product

Y = U. S. per capita personal disposable income

CPI = BLS consumer price index

CPI_{mpf} = BLS consumer price index for meat, poultry, and fish

P_s = price of close substitutes

Upon selection of the best estimating equation, price variables are held constant and projectd Y/CPI and projected N are used to obtain a projection of C.

By this analysis, we are able to make projections for the following products:

Fresh and frozen salmon

Fresh and frozen shrimp (South Atlantic and Gulf)

Fresh and frozen crab (blue)

Frozen fish sticks and portions

Fresh and frozen scallops (all)

Fresh and frozen flounder and sole (all)

Fresh and frozen clams (all)

Although shrimp other than the Gulf and South Atlantic are not included in the projection, shrimp demand is expected to expand so rapidly that Alaska and many other areas will be able to expand catch greatly, at least from the standpoint of the market. As a matter of fact, a Division economist has projected that world demand for shrimp will completely exhaust all presently known resources by around 1980 to 1985 (see Working Paper 15).

The blue crab projection was doubled in order to approximate total market potential for all crabs. The estimating equation included only blue crabs and it is assumed the same relationships hold for all crabs. Blue crabs have accounted for about half of the total market supply in recent years.

Fresh and frozen salmon are included in this category since more of the product could be switched from canned to fresh and frozen if the market potential warranted.

In addition, projections are provided for whitefish, lake trout, and fish meal, but with less analytical foundation than the above. The other species are those for which insufficient data are available to make projections. Table 1 shows the projections through 1980 for each product listed.

Table 1. Projections of fish consumption 1970, 1975, and 1980, selected species (million pounds edible weight) 1/

	Year		
	1970	1975	1980
Fresh and frozen salmon	36.0	38.0	41.0
Fresh and frozen shrimp	412.0	561.7	797.3
Fresh and frozen crab	45.3	55.7	69.1
Fresh and frozen scallops	40.0	45.4	52.7
Fresh and frozen flounder and sole	103.4	129.5	167.0
Frozen fish sticks and portions	242.0	283.0	348.6
Fresh and frozen clams	43.7	54.0	68.2
Fresh and frozen lake trout Fresh and frozen whitefish	very slow increase with current market forms; increase of 4% per year if product is processed in convenience food form		
Fish meal (in thousand tons)	1,000	1,100	1,300

1/ Projections made with price held constant at 1966-68 level.

Fish sticks are included to show what can be done with a new technology of fish processing. It is not suggested that fish sticks and portions *per se* should be produced in Alaska, but the best potential of underutilized finfish probably will be in some highly processed form such as this. We therefore make two projections for the underutilized species; (1) maintain current status unless sold in a highly processed frozen form, and (2) increase at 4 percent per year (see equation 6) if sold in a frozen convenience

package. Section 3 will also throw light on the effect of processing and preservation methods on market potential.

These projections are made on the basis that prices of the products will remain the same relative to other prices in the economy. Therefore, changes in income and changes in population in the future will be the source of changes in consumption of these fish products. The strength of the effect of income is shown by the income coefficient of each estimating equation (shown below). Population is assumed to affect consumption only by changes in numbers. Other demographic changes in the population are assumed neutral for these purposes.

Following are the estimating equations used for each species shown in table 1.

Fresh and Frozen
Salmon

$$(1)\ \log \frac{C}{N} = 1.606 - \underset{(3.03)}{1.04} \log P_w + \underset{(.127)}{.006} \log Y - \underset{(.88)}{.34} \log P_s \ \underline{1/}$$

$$R^2 = .66 \quad D.W. = 2.48$$

Fresh and Frozen
Shrimp

$$(2)\ \log \frac{C}{N} = 2.21 - \underset{(1.70)}{.46} \log P_r \ \underline{2/} + \underset{(10.03)}{1.77} \log Y$$

$$R^2 = .89 \quad D.W. = .79$$

Fresh and Frozen
Crab

$$(3)\ \log \frac{C}{N} = -1.35 - \underset{(1.31)}{.50} \log P_w + \underset{(3.007)}{.99} \log Y$$

$$R^2 = .66 \quad D.W. = 2.12$$

Fresh and Frozen
Scallops

$$(4)\ \log \frac{C}{N} = -1.38 - \underset{(4.013)}{.565} \log P_w + \underset{(1.82)}{.486} \log Y$$

$$R^2 = .59 \quad D.W. = 1.77$$

Fresh and Frozen
Flounder

$$(5)\ \log \frac{C}{N} = -3.8 - \underset{(.785)}{.32} \log P_w + \underset{(4.18)}{1.17} \log Y$$

$$R^2 = .86 \quad D.W. = 1.88$$

Frozen
Fish sticks and portions

$$(6)\ \log \frac{C}{N} = .09 - \underset{(.59)}{.27} P_w + \underset{(8.35)}{.044} (\text{time})$$

$$R^2 = .98 \quad D.W. = 1.18$$

Fresh and Frozen
Clams

$$(7)\ \log \frac{C}{N} = -2.72 - \underset{(2.255)}{1.008} \log P_w + \underset{(1.38)}{1.06} \log Y + \underset{(1.93)}{2.05} \log CPI_{mpf}$$

$$R^2 = .73 \quad D.W. = 1.65$$

1/ Price of canned salmon

2/ Retail price

In these equations coefficients in the first row show the percentage change in the dependent variable (C/N) related to a one percent change in the independent variables (P_w, Y, etc.) The figures in parentheses, shown in the second row, are "t" values which test the accuracy of the coefficients in the first row. R^2 determines the percent of variation in C/N which has been explained by the other variables. D.W. is the Durbin-Watson statistic which is an indicator of whether the equation has been properly formulated.

Under the assumption made of constant relative prices, the income elasticity is the determining factor in the rate of increase in consumption. These and the price elasticities are summarized in table 2.

Table 2. Income and wholesale price elasticities, selected fish products

	Elasticities	
	Income	Price
Fresh and frozen salmon	0.006	-1.04
Fresh and frozen shrimp	1.77 1/	-0.46 1/
Fresh and frozen crab	0.99	-0.50
Fresh and frozen scallops	0.49	-0.57
Fresh and frozen flounder	1.17	-0.32
Frozen fish sticks	(4.4) 2/	-0.27
Fresh and frozen clams	1.06	-1.01

1/ At the retail level
2/ Based on equation (6), a projected increase from 1970 to 1980 of 4.4 percent per year

Shrimp is seen to be the product with the highest percentage growth projection--a tremendously important fact in view of its large absolute volume in the market. In view of the projected world demand there is little doubt that Alaska should put primary emphasis on developing the shrimp resource, if this can be harvested at a cost competitive with other areas.

Aggregate real incomes increase on an average of 5 to 6 percent per year. This means that fish sticks and portions and those products with an income elasticity of approximately one, crab, flounder, and clams, will all experience market expansion at approximately the same rate. Scallops unexplainably will increase at only half this rate. Marketing practices, as well as processing of species such as Pacific flounder will have to be improved if the rate of increase is to be obtained.

Little potential for increase is seen for fresh and frozen salmon, lake trout, whitefish and the other underutilized species unless new market forms are developed, as discussed elsewhere.

The leading fish meal marketing analyst in the Bureau foresees a very slow increase in fish meal use. Competition will increase from other meal products, particularly soybeans, and from specialized ingredients such as amino acids. Therefore a program to expand markets for underutilized fish through fish meal may meet with limited success. The market possibilities for FPC remain a conjecture at this time.

In summary, shrimp shows the greatest growth potential both in percentage and absolute terms. Crab, scallops, flounder, and clams can all experience considerable growth, particularly if sold in convenience food forms. Little potential is seen for expanding the market for the other species unless new market forms, similar to frozen fish sticks and portions are developed. Future utilization of Alaskan products for fish meal manufacture is not bright.

2. Estimated price range to compete in or remain in U. S. market

Competitive prices of Alaskan fishery products, just as for all consumer goods, are dependent upon consumer demand, including reaction to price, effect of income, and degree of substitutability among products. Cost of production must also be known to determine price. There are essentially no data available to specify production costs at this time. Therefore, this section can only deal with demand factors and the conclusions drawn based only on one-half of the information needed. The relationships presented here throw considerable light on how market forces are likely to affect prices and give some indications of what supply conditions will be necessary for competitive pricing.

For this section, the same division by species is made as for the previous section in terms of current catch relative to MSY. For those which supply can be expanded, a reasonable estimate is that prices must remain the same relative to general prices as at present in order to remain competitive. For those products, i.e., salmon and halibut which are harvested about at MSY, it would be expected that population and income increases would push up the price of this fixed supply. An extensive price analysis of these two products, however, fails to reveal significant effects of population and income on these prices. Tables 3 and 4 summarize the findings of this analysis.

Salmon prices

Competitive prices for salmon other than pink are dependent on how these prices are related to the price of pink salmon. Red salmon is also a partial determinant of two varieties of salmon.

Chum salmon price is the most closely related to pink. The two are shown to change in almost exactly the same percentage to each other. Silver salmon prices are highly dependent on both pink and red salmon prices. An independent movement of 1 percent in either pink or red price will cause about a .7 percent change in silver prices in the same direction. The price of king salmon is also largely determined by pink and red prices with red having a slightly higher percentage influence than pink.

There are, no doubt, several factors external to salmon prices and consumption which influence red salmon prices, however, pink salmon price is seen to have some influence on red salmon price. Quantity marketed of red salmon is also very strongly related to price. The coefficient shows that quantity can be increased 1 percent with only a .2 percent decrease in price, i.e., the price is quite inflexible.

In spite of the finding of dependence of other salmon prices on pink salmon, little success was obtained in deriving an estimating equation for pink salmon. The first three equations of table 3 show pink salmon price equations containing alternatively consumer income, consumer food expenditures and the ratio of food

Table 3. Estimating equation for canned salmon prices (logarithmic equations, annual data 1950-67)

Dependent variable	Independent Variables: Consumption	Pink price	Red price	Aggregate DPI	Food expenditures index	Food expenditures divided by DPI	Constant	R^2	D.W.
pink price	-.12 (1.86)			1.58 (.11)			1.84	.21	1.14
pink price	-.15 (3.94)				.14 (.56)		2.66	.55	1.28
pink price	-.15 (3.88)					-.10 (.54)	3.38	.55	1.28
red price	-.17 (4.98)	.18 (1.82)					1.81	.62	1.57
chum price	-.046 (1.42)	1.05 (7.27)					-1.11	.81	1.85
silver price	-.037	.69 (6.47)	.77 (4.29)				-.79	.84	1.92
king price	-.01 (.41)	.29 (2.85)	.40 (2.37)				.63	.52	1.006

expenditures to consumer income. Although rather inconclusive, the equations indicate a positive relationship to increasing trends, i.e., aggregate consumer income and food expenditures, and a negative relationship to decreasing trends, i.e., the ratio of food expenditure to income. The equations also show that prices are quite inflexible meaning that supplies can be increased substantially without decreasing total revenue. This information is of value in year-to-year variations in supply, however, since under present conditions, long range increases cannot be made.

Halibut prices

Halibut prices are found to be relatively flexible to changes in consumption (supply) as shown by the consumption coefficients of table 4. Thus increases in supply, when they occur, result in a decrease in total revenue to the industry. Similar to canned salmon, halibut does not appear to be strongly influenced by changes in consumer income and population. As a matter of fact, changes in consumption patterns seem to be exerting downward pressure on halibut prices. The ratio of food expenditures to consumer income, (a decreasing series) is positively related to halibut prices. Consumer income and food expenditure (increasing series) are negatively related to halibut prices.

These equations raise questions as to the potential for increases in canned salmon and fresh and frozen halibut marketing

Table 4. Estimating equations for fresh and frozen halibut prices (in logarithms, annual data 1954-67)

Dependent variable	Independent Variables: Consumption	Fresh and frozen salmon price	Aggregate DPI	Food expenditures index	Food expenditures divided by DPI	Constant	R^2	D. W.
ex-vessel halibut price	-1.28 (3.11)	.25 (1.27)	-.86 (1.58)			3.33	.65	2.44
	-1.46 (2.04)	-1.06 (.45)		-1.06 (.45)		3.87	.45	2.55
	-2.02 (2.20)	.19 (.42)			2.05 (1.00)	-6.21	.49	2.63

even if supply were not restricted. Therefore, competitive prices for these products probably will tend downward over time. Based on the presentation in the following section, consideration should be given to new market forms, in order to reverse the market trends now occurring.

3. Trends in preservation and product forms

Tremendous changes have taken place in fish processing and preservation. These changes are not so much related to species as to changes in marketing by types of products, therefore, trends in the type of processing and preservation regardless of species, seems to be more important. Of course, choice of preservation and processing is not independent of species. What this means is that expansion in production will find a wider market if species which can be subjected to the more popular market forms are fished.

The growth category of frozen fish and shellfish is phenomenal especially since most or all of the increase in "fresh and frozen unspecified" can be also allocated to frozen (see tables 5 and 6). For information on processing and preservation by species see Fishery Statistics of the United States, U. S. Department of the Interior. Of the major canned fish and shellfish, only tuna shows an expanding demand. The manufacturers' value per pound of frozen fish products has also expanded somewhat more rapidly than canned, the former increasing from $0.22 to $0.54 per pound from 1946 to 1966, while canned increased from $0.33 to $0.61 during this period. These factors point clearly toward a shift in market preference from one form to the other.

Table 5. Fish and shellfish by method of preservation, U. S. manufacturing (In thousands of pounds).

Year	Canned	Cured	Fresh 1/	Frozen	Fresh and frozen unspec.	Unprocessed	Total
1931	503,642	98,969	118,919	15,341	5,023		
1934	685,443	98,141	111,670	33,437	5,486		
1937	723,842	104,339	133,140	64,748	3,915		
1940	673,877	97,326	134,355	96,248	6,096		
1943	620,658	91,754	165,272	108,022	1,409		
1946	699,376	87,108	137,233	138,462	4,852		
1949	762,291	4,714 2/	58,906	133,701	2,387		
1952	647,322	57,144	59,962	213,335	81,453		
1955	588,078	80,501	53,110	229,852	171,654		
1958	736,609	75,261	55,053	276,802	175,358		
1961	708,707	74,453	62,414	323,231	186,643		
1964	742,114	65,519	79,740	381,703	235,122		
1966	822,369	65,786	78,016	476,371	308,108		
1967	698,312	NA	NA	NA	NA		

Source: Fishery Statistics of the United States, Manufactured Fishery Products.

1/ Does not include unprocessed fish

2/ Incomplete

Table 6 . Fish and shellfish by method of preservation, U. S. manufacturing
(In thousands of dollars)

Year	Canned	Cured	Fresh[1]	Frozen	Fresh and Frozen Unspec.	Unprocessed	Total
1931	62,656	12,364	20,051	2,043	[illegible]		
1934	79,069	13,047	16,591	3,263	824		
1937	104,249	15,635	20,839	5,786	1,053		
1940	92,192	14,234	21,996	9,899	852		
1943	141,084	14,110	35,419	20,779	423		
1946	227,629	15,077	31,540	29,843	1,577		
1949	286,840	1,661[2]	17,330	30,967	787		
1952	290,161	26,717	21,940	89,575	51,090		
1955	274,967	37,684	17,676	96,607	116,336		
1958	344,737	41,657	21,221	129,729	131,903		
1961	382,809	52,396	22,908	157,145	140,901		
1964	391,026	47,783	31,664	178,679	192,338		
1966	507,841	52,499	35,120	256,205	247,463		
1967	455,240	NA	NA	NA	NA		

Source: Fishery Statistics of the United States, Manufactured Fishery Products.
1/ Does not include unprocessed fish
2/ Incomplete

Distinct trends are also shown in degree of processing, those products closest to the convenience food category experiencing strongest upward trends shown in tables 7 and 8. The trend in "shell removed," i.e., peeled, shucked, picked, etc., is mainly influenced by the increasing consumption of shrimp, however, demand for peeled and deveined shrimp (with the additions of further processing) almost completely dominates the shrimp market. Breaded products are made up of some of the products of the other three categories and show how rapidly all kinds of frozen fish products are entering this type of processing.

These tables should be related back to section 1 which analyzes potential by species. As stated in that section, the potential is great if fish products can be delivered in a frozen highly processed, convenience form, but the potential for increase is not bright without this value added.

Table 7. Fish and shellfish by method of processing, U. S. manufacturing
(In thousands of pounds)

Year	Filleted	Shell Removed	Breaded	Sticks and Portions
1931	70,414	98,079		
1934	68,707	112,884		
1937	115,620	138,153		
1940	113,538	146,747		
1943	135,565	145,564		
1946	164,931	155,073		
1949	184,746	53,066 1/		
1952	181,567	166,449	18,042	
1955	148,697	217,127	118,513	73,045
1958	143,649	264,280	161,944	82,801
1961	146,292	302,074	222,088	129,964
1964	149,672	355,412	286,317	179,887
1966	155,962	421,911	370,573	228,996
1967	144,377	NA	NA	NA

Source: Fishery Statistics of the United States, Manufactured Fishery Products
1/ Incomplete

Table 8. Fish and shellfish by method of processing, U. S. manufacturing (In thousands of dollars)

Year	Filleted	Shell Removed	Breaded	Sticks and Portions
1931	10,247	20,172		
1934	7,926	21,241		
1937	12,625	28,049		
1940	13,340	27,794		
1943	35,293	31,419		
1946	42,975	48,286		
1949	45,486	31,855 1/		
1952	51,630	107,566	13,614	
1955	40,579	139,738	65,429	33,046
1958	44,748	181,462	90,604	34,972
1961	45,795	212,498	120,316	50,629
1964	51,701	258,579	141,929	66,518
1966	63,446	347,144	213,449	93,800
1967	59,122	NA	NA	NA

Source: Fishery Statistics of the United States, Manufactured Fishery Products.

1/ Data incomplete

4. Geographic market patterns

It is only within the last month that quantitative information has become available on fish marketing and consumption by region. We now have purchase records for February, March and April of 1969 showing regional purchases for the major fish products (table 9).

These are for household purchases and do not include away from home consumption. The relative importance by region is shown here. The obvious point on this table is that fish consumption is higher in those regions containing States adjacent to the coast, even though some of the products are imported from other areas, for example New England is high in shrimp purchases. In general, however, products are most heavily consumed in areas of production.

The table does not answer, in any way, if the potential expansion is in new areas, or in traditional fish consuming regions. Market research to be conducted during the next 12 to 18 months is expected to provide such information.

Table 9. Relation between per capita consumption of selected species and regions for February, March, and April of 1969

Fish Items	New England	Middle Atlantic	E. North Cent.	W. North Cent.	South Atlantic	E. South Cent.	W. South Cent.	Pacific
	(pounds per capita)							
Fresh and Frozen	(pounds per capita)							
Shrimp	.4	.3	.2	.1	.3	.3	.4	.2
Oysters	.1	.0	.0	.0	.2	.2	.1	.1
Haddock	.6	.3	.2	.2	.2	.1	.0	.1
Flounder, sole	.2	.3	.1	.0	.2	.1	.2	.2
Halibut	.1	.1	.1	.1	.0	.0	.0	.3
Ocean perch	.0	.1	.3	.3	.3	.5	.3	.1
Cod	.2	.2	.2	.1	.2	.2	.1	.2
Catfish	.0	.0	.0	.0	.0	.5	.2	.0
Total	1.6	1.3	1.1	.8	1.4	1.9	1.3	1.2
Canned								
Salmon	.3	.4	.4	.4	.5	.8	.5	.4
Tuna	1.1	.9	.6	.6	.7	.7	.7	1.0
Sardines, Maine	.1	.1	.0	.0	.1	.1	.1	.0
Sardines, Imported	.0	.1	.0	.0	.0	.0	.0	.1
Shrimp	.1	.1	.0	.0	.0	.0	.0	.1
Oysters	.0	.0	.0	.1	.1	.1	.1	.1
Total	1.6	1.6	1.0	1.1	1.4	1.7	1.4	1.7
Grand total	3.6	3.3	2.2	2.0	3.2	3.8	2.7	3.4

Does not include crabs, lobster, clams or scallops. Data on these species although collected were not reported on first quarterly report of this survey.

Socio-Economic Characteristics are not included in this table, although available.

1/ Includes additional product forms

Source: U. S. Department of the Interior, Bureau of Commercial Fisheries

Conclusions: Based on the analysis presented in Section A, there is a bright prospect for Alaskan fisheries if approached correctly. In particular:

1. Shrimp shows biggest growth potential in both absolute and percentage terms.

2. The higher valued groundfish and shellfish (not shrimp) will increase about as rapidly as aggregate DPI--5 to 6 percent per year.

3. We should expect slow market growth of low valued and underutilized species--unless they are manufactured into convenience food forms.

4. Canned salmon and fresh and frozen halibut show little growth potential (i.e., little price increase) and the resource will not permit supply expansion. However, the profitability of operations as they exist is not determined. This may be acceptable to those in the industry at present.

5. The analysis does not go into significant cost analysis (i.e., analysis of supply functions). We have done only market analysis (analysis of demand and prices). Therefore the conclusions must be less precise than they would be otherwise.

B. Foreign (export) potentials for Alaska species or groups

To date little consideration has been given to the export potential for Alaskian marine products. Comitini, on the basis of a Japanese report, wrote of the market oportunities for Alaskan seafood in Japan.[1/] The approach used by Comitini was to consider what Alaska's fisheries could contribute to satisfying an increasing demand for marine products in Japan. By matching Alaska's fishery resource potential against what knowledge is available on foreign demand an estimate can be obtained of Alaska's export potential.

Significant export markets exist for fresh and frozen salmon, groundfish, other finfish, shrimp and other shellfish, canned salmon, canned squid, other canned shellfish and cured, salted, pickled, or dry cured fish and shellfish. It is impossible to state precisely what percentage of these exports are landed in Alaska. Data is available for exports through the Juneau customs district, which includes all Alaska. Some undetermined volume of marine products from Alaska is, however, exported through Seattle and Portland.

1/ Salvatore Comitini, "Prospects for Alaska-Japan Trade Relations in Marine Products," in Arlon R. Tussing et. al. Alaska Japan Economic Relations, University of Alaska, 1968.

About five percent of the edible seafoods exported from the United States are exported through the Juneau customs district. Slightly over five percent of the fresh and frozen salmon exported from the United States leaves through Juneau. Probably a considerable amount of Alaskan salmon is exported through Seattle. Over ten percent of all fresh and frozen finfish, excluding salmon, cod, haddock, hake, pollack and cusk, are exported through Juneau. These exports are primarily herring and halibut, and comprise nearly 30 percent of exports through Juneau in 1966. The largest product category to be exported from Juneau has been: "fish, except shellfish prepared or preserved." This category includes herring eggs and salmon roe. Over 40 percent of Alaska's seafood exports through Juneau were in this category in 1966. In 1968 28 percent of the edible fish exported through Juneau were frozen salmon and 60 percent was salted dried or salted finfish (primarily salmon).

Between 1965 and 1968 from 97 to over 99 percent of all edible fishery products exported from Juneau have gone to Japan and Canada. Canada has imported primarily frozen salmon and other frozen finfish. Japan has imported frozen salmon and other frozen finfish plus large amounts of cured and preserved fish (primarily salmon and salmon and herring roe). Only small quantities of fish and shellfish have

been exported to European countries through Juneau. Because of the volume of Alaskan fish and shellfish leaving the United States through Seattle, Portland and other U. S. ports is unknown, it is impossible to say what percentage of each fish and shellfish commodity category exported to individual countries is made up of Alaskan fish. The Alaskan fishing industry would be well advised to keep in mind the economies of volume transport and marketing.

In general it should be expected that world demand for marine products will expand considerably during the next decade. A growing population and increasing affluence accompanied by improved marketing facilities, notably in Western Europe and Japan, is resulting in a rapid rise in world demand for seafoods and other marine products.

Comitini found that the market potential for Alaskan seafood in Japan is promising. By 1971 Japan's demand for marine products will be 32 percent greater than Japan's 1965 catch. By 1976 demand will be 47 percent greater than the 1965 catch. The Japanese Government has an active program of stimulating expanded capacity in the fishing industry to cover increasing domestic demand and thereby to minimize Japan's trade deficit in marine products. It is anticipated, however, that demand will still increase faster than domestic supply.

Marketing opportunities for Alaskan seafoods in Western Europe is also promising. A study by the GATT International Trade Center states that there is a rapidly increasing demand for shrimp and prawns in Western Europe -- the United Kingdom, France, the Federal Republic of Germany and Switzerland were studied.[2/] Rising income and improved distributive facilities for frozen foods are the primary factors in the growth in demand. In addition evidence is cited that Europeans are, to an increasing extent, demanding prepackaged and convenience foods. High quality convenience seafood items, especially shellfish, should find an expanding market in Western Europe for the same reasons as has shrimp. The favorable export experience of Maine shrimp during the past several years is indicative of the export potential for Alaska shrimp.

The question of expected price for various levels of export sales of each commodity classification is of importance. It is difficult to make a precise statement of the price which may be expected in each potential importing country for each commodity classification. In most cases, expanded production and export of individual species of fish and shellfish would be matched by increasing demand in several countries. Markets are already developed for "established" Alaskan fisheries, such as salmon, shrimp, crabs, halibut, and

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2/ GATT International Trade Centre, Major Markets for Shrimp and Prawns in Western Europe, Geneva 1967.

scallops. The demand for these species can be expected to grow. Profitable export of these species will be dependent on acceptable product forms and quality and upon efficiency in harvesting and processing. Latent fishery resources such as sablefish, Pacific ocean perch, pollock, yellow fin, rock sole, turbot and flathead sole are already harvested and marketed by the Japanese and Russians, thus limited markets are already in existence. Given an adequate marketing organization those species should be exportable to Japan and other nations without weakening price.

Relative to the United States as a whole, Alaskan fish and shellfish exports tend to have a higher average value. This comparison may be seen in tables 10, 11, 12, and 13. Frozen salmon is an important exception. In 1968 the average value of exported frozen salmon was 62 cents for the U. S. as a whole. For Alaska the average value of exported salmon was 34 cents. Over 80 percent of Alaska's frozen salmon export was to Japan in 1968. Alaska should continue to emphasize a high quality, high price export product.

Table 10. The Average Price of Fish and Shellfish Exported from Alaska - 1968

Schedule B Commodity Number	Weighted Average	Canada	Sweden	United Kingdom & N. Ireland	Netherlands (Holland)	Belgium & Luxembourg	France Corsica Andorra Monaco	West Germany	Japan
031.1030	.531		.531						
.1040	.429	.429							
.1050	.852				.852				
.1060	.340	.341	.457						.339
.1070	.303	.303							
.1090	.228	.228							
.2000	1.286							.831	1.286
.3055)).3060 1/	.924				.923			.898	.927
.3065)	.250								.250
032.0110	.430	.430							
.0135)).0140 1/ .0145)	1.283								1.283
.0225)).0230 1/ .0235)	.379								.379
TOTAL	.996	.349	.522		.921			.881	1.047

1/ Prior to 1968 the schedule B commodities for these commodity numbers were combined.

Source: EA664 Exports of Domestic and Foreign Merchandise (district of exportation by schedule B commodity number by country of destination) 1966.

Table 11. The Average Price of Fish and Shellfish Exported from Alaska - 1967

Schedule B Commodity Number	Weighted Average	Canada	Sweden	United Kingdom & N. Ireland	Nether-lands (Hol-land)	Belgium & Luxem-bourg	France Corsica Andorra Monaco	West Germany	Japan
031.1030	.289							.290	
.1040	.368	.368							
.1050	.359	.359							
.1060	.358	.436		.659					.307
.1070	.279	.279							
.1080	.038	.038							
.1090	.309	.308						.752	
.2000	1.251	.255							1.294
.3040	1.352				1.952		1.464	.621	
.3055)).3060 1/ .3065)	2.175							2.175	
032.0135)).0140 1/ .0145)	1.261								1.261
TOTAL	.706	.309		.659	1.952		1.464	1.177	1.036

1/ Prior to 1968 the schedule B commodities for these commodity numbers were combined.

Source: EA664 Exports of Domestic and Foreign Merchandise (district of exportation by schedule B commodity number by country of destination) 1967.

Table 12. The Average Price of Fish and Shellfish Exported from Alaska - 1966

Schedule B Commodity Number	Weighted Average	Canada	Sweden	United Kingdom & N. Ireland	Netherlands (Holland)	Belgium & Luxembourg	France Corsica Andorra Monaco	West Germany	Japan
031.1010	.288	.288							
.1060	.302	.292		.523					.270
.1070	.364	.364							
.1080	.388	.388							
.1090	.183	.319							..130
.2000	1.048								1.048
.3030	1.040								1.040
.3040	1.275						1.297	1.085	
.3055)).3060 1/ .3060)	1.178						1.209	1.195	.923
032.0135)).0140 1/ .0145)	.996								.996
TOTAL	.602	.308		.523			1.283	1.166	.720

1/ Prior to 1968 the schedule B commodities for these commodity numbers were combined.

Source: EA664 Exports of Domestic and Foreign Merchandise (district of exportaticn by schedule B commodity number by country of destination) 1966.

Table 13 . The Average Price of Fish and Shellfish Exported from Alaska - 1965

Schedule B Commodity Number	Weighted Average	Canada	Sweden	United Kingdom & N. Ireland	Nether-lands (Hol-land)	Belgium & Luxem-bourg	France Corsica Andorra Monaco	West Germany	Japan
031.1010	.199	.199							
.1040	.253	.253							
.1050	.448	.448							
.1060	.332	.342					.689		.282
.1070	.301	.301							
.1090	.273	.273							
.2000	1.029								1.029
.3030	.970	.970							
.3040	1.264						1.264		
.3055)).3060 1/ .3065)	1.206					.840	1.214	1.207	1.494
032.0110	.753	.753							
.0135)).0140 1/ .0145)	1.009								1.009
TOTAL	.708	.453				.840	1.222	1.207	.988

1/ Prior to 1968 the schedule B commodities for these commodity numbers were combined.

Source: EA664 Exports of Domestic and Foreign Merchandise (district of exportation by schedule B commodity number by country of destination) 1965.

Table 14. ALASKAN EXPORTS (fish and shellfish) - 1968

Schedule B Commodity Number		Canada	Sweden	United Kingdom and N. Ireland	Netherlands (Holland)	Belgium and Luxembourg	France Corsica Andorra Monaco	West Germany	Japan	Total
031.1030	quantity		44,900							44,900
	value		23,859							23,859
031.1040	quantity	70,828								70,828
	value	30,454								30,454
031.1050	quantity				568					568
	value				484					484
031.1060	quantity	278,369	6,100						1,613,250	1,897,719
	value	94,994	2,786						547,613	645,393
031.1070	quantity	71,145								71,145
	value	21,547								21,547
031.1090	quantity	26,675								26,675
	value	6,086								6,086
031.2000	quantity							354	4,344,365	4,344,719
	value							294	5,584,845	5,585,139
031.3055	quantity				20,087			1,087	21,889	43,063
	value				18,540			976	20,290	39,806
(.3060)[1/] 031.3065	quantity								14,209	14,209
	value								3,552	3,552

Table 14 (continued). ALASKAN EXPORTS (fish and shellfish) - 1968

Schedule B Commodity Number		Canada	Sweden	United Kingdom and N. Ireland	Netherlands (Holland)	Belgium and Luxembourg	France Corsica Andorra Monaco	West Germany	Japan	Total
032.0110	quantity	36,259								36,259
	value	15,591								15,591
032.0135 (.0140)1/										
032.0145	quantity								621,793	621,793
	value								797,614	797,614
032.0225 (.0230)1/	quantity									
	value									
032.0235	quantity								35,283	35,283
	value								13,361	13,361
TOTAL	QUANTITY	483,276	51,000		20,655			1,441	6,650,789	
	VALUE	168,672	26,645		19,024			1,270	6,967,275	

GRAND TOTAL: quantity in lbs. 7,207,361
: value in dollars 7,182,886

1/ Prior to 1968 the schedule B commodities for these commodity numbers were combined.

Source: EA664 Exports of Domestic and Foreign Merchandise (district of exportation by schedule B commodity number by country of destination) 1968.

Table 15. ALASKAN EXPORTS (fish and shellfish) - 1967

Schedule B Commodity Number		Canada	Sweden	United Kingdom and N. Ireland	Netherlands (Holland)	Belgium and Luxembourg	France Corsica Andorra Monaco	West Germany	Japan	Total
031.1030	quantity							690		690
	value							200		200
031.1040	quantity	826,908								826,908
	value	304,270								304,270
031.1050	quantity	11,985								11,985
	value	4,300								4,300
031.1060	quantity	250,015		48,000					676,710	974,725
	value	108,953		31,640					208,260	348,853
031.1070	quantity	379,957								379,957
	value	105,860								105,860
031.1080	quantity	243,500								243,500
	value	9,149								9,149
031.1090	quantity	561,189						862		562,051
	value	173,045						648		173,693
031.2000	quantity	34,523							805,351	839,874
	value	8,803							1,042,136	1,050,939
031.3040	quantity				930		7,415	1,900		10,245
	value				1,815		10,858	1,180		13,853

Table 15 (continued). ALASKAN EXPORTS (fish and shellfish) - 1967

Schedule B Commodity Number		Canada	Sweden	United Kingdom and N. Ireland	Netherlands (Holland)	Belgium and Luxembourg	France Corsica Andorra Monaco	West Germany	Japan	Total
031.3055	quantity							2,041		2,041
	value							4,440		4,440
(.3060)1/										
031.3065	quantity									
	value									
032.0135	quantity								1,263,245	1,263,245
	value								1,593,463	1,593,463
(.0140)1/										
032.0145	quantity									
	value									
TOTAL	QUANTITY	2,308,077		48,000	930		7,415	5,493	2,745,306	
	VALUE	714,380		31,640	1,815		10,858	6,468	2,843,859	

GRAND TOTAL: quantity in lbs. 5,115,221
: value in dollars 3,609,020

1/ Prior to 1968 the schedule B commodities for these commodity numbers were combined.

Source: EA664 Exports of Domestic and Foreign Merchandise (district of exportation by schedule B commodity number by country of destination) 1967.

Table 16. ALASKAN EXPORTS (fish and shellfish) - 1966

Schedule B Commodity Number		Canada	Sweden	United Kingdom and N. Ireland	Netherlands (Holland)	Belgium and Luxembourg	France Corsica Andorra Monaco	West Germany	Japan	Total
031.1040	quantity	988,481								988,481
	value	284,265								284,265
031.1060	quantity	474,285		49,700					188,517	712,502
	value	138,485		25,992					50,953	215,430
031.1070	quantity	22,000								22,000
	value	8,000								8,000
031.1080	quantity	238,670								238,670
	value	92,575								92,575
031.1090	quantity	670,112							1,713,521	2,383,633
	value	213,778							222,468	436,246
031.2000	quantity								433,698	433,698
	value								454,544	454,544
031.3030	quantity								66,759	66,759
	value								69,429	69,429
031.3040	quantity						20,960	2,494		23,454
	value						27,195	2,705		29,900
031.3055	quantity						3,930	7,048	914	11,892
	value						4,752	8,419	844	14,015
(.3060)1/ 031.3065	quantity									
	value				41					

Table 16 (continued). ALASKAN EXPORTS (fish and shellfish) - 1966

Schedule B Commodity Number		Canada	Sweden	United Kingdom and N. Ireland	Netherlands (Holland)	Belgium and Luxembourg	France Corsica Andorra Monaco	West Germany	Japan	Total
032.0135	quantity								3,383,458	3,383,458
	value								3,369,113	3,369,113
(.0140)1/										
032.0145	quantity									
	value									
TOTAL	QUANTITY	2,393,548		49,700			24,890	9,542	5,786,867	
	VALUE	737,103		25,992			31,947	11,124	4,167,351	

GRAND TOTAL: quantity in lbs. 8,264,547
: value in dollars 4,973,517

1/ Prior to 1968 the schedule B commodities for these commodity numbers were combined.

Source: EA664 Exports of Domestic and Foreign Merchandise (district of exportation by schedule B commodity number by country of destination) 1966.

Table 17. ALASKAN EXPORTS (fish and shellfish) - 1965

Schedule B Commodity Number		Canada	Sweden	United Kingdom and N. Ireland	Netherlands (Holland)	Belgium and Luxembourg	France Corsica Andorra Monaco	West Germany	Japan	Total
031.1010	quantity	20,454								20,454
	value	4,090								4,090
031.1040	quantity	70,865								70,865
	value	17,916								17,916
031.1050	quantity	73,625								73,625
	value	33,012								33,012
031.1060	quantity	347,216					290		73,982	421,488
	value	118,722					200		20,880	139,802
031.1070	quantity	505,223								505,223
	value	152,154								152,154
031.1090	quantity	148,710								148,710
	value	40,651								40,651
031.2000	quantity								1,084,810	1,084,810
	value								1,116,709	1,116,709
031.3030	quantity	12,000								12,000
	value	11,640								11,640
031.3040	quantity						5,875			5,875
	value						7,425			7,425
031.3055	quantity					357	11,190	1,607	174	13,328
	value					300	13,586	1,940	260	16,086
(.3060)1/ 031.3065	quantity									
	value									

Table 17 (continued). ALASKAN EXPORTS (fish and shellfish) - 1965

Schedule B Commodity Number		Canada	Sweden	United Kingdom and N. Ireland	Netherlands (Holland)	Belgium and Luxembourg	France Corsica Andorra Monaco	West Germany	Japan	Total
032.0110	quantity	518,844								518,844
	value	390,846								390,846
032.0135	quantity									
	value									
(.0140)1/									355,896	355,896
032.0145	quantity								359,125	359,125
	value									
TOTAL	QUANTITY	1,696,937				357	17,355	1,607	1,514,862	
	VALUE	769,031				300	21,211	1,940	1,496,974	

GRAND TOTAL: quantity in lbs. 3,231,118
: value in dollars 2,289,456

1/ Prior to 1968 the schedule B commodities for these commodity numbers were combined.

Source: EA664 Exports of Domestic and Foreign Merchandise (district of exportation by schedule B commodity number by country of destination) 1965.

Table 18. The Export of Alaskan Fish and Shellfish
As A Percent of Total U. S. Exports of Fish and Shellfish

1965-68

Schedule B Commodity Number	1965 Quantity	1965 Value	1966 Quantity	1966 Value	1967 Quantity	1967 Value	1968 Quantity	1968 Value
031.1010	4.09	3.62						
.1020								
.1030					1.34	.12	15.39	23.65
.1040	23.43	13.99	66.56	56.07	47.63	34.21	11.41	9.06
.1050	8.16	7.99			1.76	.93	.53	.60
.1060	4.50	2.91	4.00	2.28	5.90	3.30	12.20	6.68
.1070	5.43	9.99	.27	.53	4.36	6.25	1.35	1.45
.1080			24.36	39.04	20.63	5.80		
.1090	3.14	2.94	23.60	18.73	7.61	8.18	.43	.43
.2000	42.90	51.28	21.36	21.77	30.03	34.57	64.77	69.00
.3010								
.3120								
.3030	.18	.20	1.66	1.68				
.3040	.41	.75	1.33	2.13	.65	.95		
.3050								
.3055)							5.08	3.80
).3060 1/	.35	.68	.28	.38	.04	.13		
.3065)							.34	.20
.3070								
032.0110	2.00	2.40					.63	.33
.0120								
.0130								
.0135)								
).0140 1/	10.35	17.95	38.06	53.76	23.35	30.75		
.0145)							13.24	18.12
.0210								
.0220								
.0225)								
).0230 1/								
.0235)							2.29	.82
Total Annual Percent	3.30	4.60	7.00	7.90	4.00	5.30	8.00	12.60

1/ Prior to 1968 the schedule B commodities for these commodity numbers were combined.

Sources: EA 664 Exports of Domestic and Foreign Merchandise (district of exportation by schedule B commodity number by country of destination) 1965-1968.

FT410 U. S. Exports (schedule B commodity and country) 1965-68.

Table 19. Average Export Price of U. S. Fish and Shellfish 1965-68

Schedule B Commodity Number	1965	1966	1967	1968
031.1010	.226	.252	.169	.220
.1020	.342	.389	.255	.210
.1030	.278	.318	.324	.346
.1040	.423	.341	.512	.542
.1050	.457	.709	.680	.756
.1060	.512	.542	.636	.622
.1070	.164	.188	.194	.282
.1080	.208	.242	.134	.196
.1090	.292	.230	.287	.225
.2000	.861	.994	1.087	1.207
.3010	1.035	1.040	1.116	.998
.3020	.921	.996	1.138	.963
.3030	.893	1.027	1.050	..919
.3040	.710	.798	.922	.819
.3050	.308	.528	.345	.326
.3055)				1.233
)3060 1/	.634	.886	.733	
.3065)				.418
.3070	.985	1.223	.983	.920
032.0110	.639	.710	.759	.804
.0120	.184	.181	.216	.217
.0130	.293	.328	.356	.433
.0135)				.730
).0140 1/	.616	.705	.958	
.0145)				.938
.0210	1.066	1.159	1.063	1.065
.0220	.097	.105	.122	.118
.0225)				1.697
).0230 1/	.919	1.115	1.221	
.0235)				1.053
Weighted Yearly Average	.513	.570	.620	.633

1/ Prior to 1968 the schedule B sommodities for these commodity numbers were combined.

Source: FT410 U. S. Exports (schedule B commodity and country) 1965-68.

Table 20. SCHEDULE B - STATISTICAL CLASSIFICATION OF DOMESTIC AND FOREIGN COMMODITIES EXPORTED FROM THE UNITED STATES (U.S. Bureau of the Census)

Schedule B number	Commodity description, and items included (List of items not necessarily complete)	Unit of quantity
	FISH AND FISH PREPARATIONS	
031.1010	COD, HADDOCK, HAKE, POLLOCK AND CUSK, FRESH OR CHILLED, EXCEPT PACKAGED.	LB.
031.1020	COD, HADDOCK, HAKE, POLLOCK AND CUSK, FRESH OR CHILLED, PACKAGED	LB.
031.1030	COD, HADDOCK, HAKE, POLLOCK AND CUSK, FROZEN	LB.
031.1040	SALMON, FRESH OR CHILLED, EXCEPT PACKAGED.	LB.
	COHO SALMON, CHINOOK SALMON, CHUM SALMON, PINK SALMON, RED SALMON, SOCKEYE	
031.1050	SALMON, FRESH OR CHILLED, PACKAGED	LB.
	CHINOOK CHUM COHO PINK RED SOCKEYE	
031.1060	SALMON, FROZEN	LB.
	CHINOOK CHUM COHO PINK RED SOCKEYE	
031.1070	FISH, EXCEPT SHELLFISH, FRESH OR CHILLED, N.E.C., EXCEPT PACKAGED (SPECIFY BY NAME)	LB.
	ALBACORE BASS, WHITE SEA BLUEFIN BONITO CARP CARP, SHIPPED LIVE IN TANKS CHUBS CISCOES EELS FISH, AQUARIUM FISH FOR BAIT FISH, LIVE (ANGEL, GOLD, AND TROPICAL INCLUDED) HALIBUT HERRING, LAKE HERRING, SEA JACK MACKEREL (HORSE MACKEREL) MACKEREL MULLET, GROUND PERCH, OCEAN PIKE PILCHARDS ROSE FISH SAUGERS SCUP SHAD SMELTS SOLE STEELHEADS STURGEON SWORDFISH TROUT, LAKE TULLIBEES TUNA WHITEFISH YELLOWFIN	
031.1080	FISH, EXCEPT SHELLFISH, FRESH OR CHILLED, N.E.C., PACKAGED (SPECIFY BY NAME)	LB.
	ALBACORE BASS, WHITE SEA BLUE FIN CARP CHUBS CISCOES EELS HALIBUT JACK MACKEREL LAKE HERRING LAKE TROUT MACKEREL MULLET, GROUND OCEAN PERCH PIKE PILCHARDS ROSE FISH SAUGERS SCUP SEA HERRING SHAD SMELTS SOLE STEELHEADS STURGEON SWORDFISH TULLIBEES TUNG WHITEFISH YELLOWFIN	
031.1090	FISH, EXCEPT SHELLFISH, FROZEN, N.E.C. (SPECIFY BY NAME)	LB.
	ALBACORE BASS, WHITE SEA BLUE FIN CARP CHUBS CISCOES EELS HALIBUT JACK MACKEREL LAKE HERRING LAKE TROUT MACKEREL MULLET, GROUND OCEAN PERCH PIKE PILCHARDS ROSE FISH SAUGERS SCUP SEA HERRING SHAD	

CONTINUED

Table 20 (continued).

Schedule B number	Commodity description, and items included (List of items not necessarily complete)			Unit of quantity
031.1090 CONT'D.	SMELTS SOLE STEELHEADS	STURGEON SWORDFISH TULLIBEES	TUNA WHITEFISH YELLOWFIN	
031.2000	FISH, EXCEPT SHELLFISH, SALTED, DRIED OR SMOKED.			LB.
	THIS HEADING INCLUDES FISH, WHOLE, IN PIECES, OR FILLETED, FISH LIVERS (EDIBLE OR NOT), AND EDIBLE ROES, AFTER THEY HAVE BEEN SALTED, AND/OR DRIED, AND/OR SMOKED, INCLUDING THOSE PRESERVED IN BRINE. IT ALSO INCLUDES FISH FLOUR FIT FOR HUMAN CONSUMPTION. REPORT FISH FLOUR UNFIT FOR HUMAN CONSUMPTION IN 0814000. FISH OF THIS HEADING REMAIN CLASSIFIED HERE EVEN IF PUT UP IN AIRTIGHT CONTAINERS.			
	ALEWIVES (RIVER HERRING) ANCHOVIES APPETITSILD BALBAGVA (SALTED FISH) BLOATERS BONITO COD COHO SIDES CUSK EELS, DRY SALTED EGGS, HERRING FINNAN HADDIE	FISH, SMOKED OR KIPPERED HADDOCK HAKE HANAGATSUO (DRIED BONITO) HERRING HERRING, KIPPERED KAZUNOKO (FISH ROE) KIPPERS LING MACKEREL MENHADEN MINNOWS	PILCHARDS POLLACK ROE, SALMON SAKURABOSHI (SALTED FISH) SALMON, KING, SIDES SALMON, SMOKED SARDINES SILAKKA SPRATS STROMMING TORSK	
031.3010	SHRIMP, FRESH OR CHILLED, NOT PACKAGED			LB.
	PRAWNS			
031.3020	SHRIMP, FRESH OR CHILLED, PACKAGED			LB.
	PRAWNS			
031.3030	SHRIMP, FROZEN			LB.
	PRAWNS, CURED		SHRIMP, BREADED	
031.3040	SHELLFISH, EXCEPT SHRIMP, FRESH OR CHILLED, NOT PACKAGED (SPECIFY BY NAME).			LB.
	CLAMS, SHUCKED OR IN THE SHELL CRABS CRAWFISH CUTTLEFISH	LOBSTERS MUSSELS OYSTERS, IN THE SHELL OYSTERS, SEED OYSTERS, SHUCKED, FRESH OR FROZEN	QUAHOGS SCALLOPS SQUID	
031.3050	SHELLFISH, EXCEPT SHRIMP, FRESH OR CHILLED, PACKAGED (SPECIFY BY NAME)			LB.
	CLAMS CRABS CRAWFISH CUTTLEFISH	LOBSTERS MUSSELS OYSTERS, SEED OYSTERS, SHUCKED	QUAHOGS SCALLOPS SQUID	
031.3055 (1-1-68)	KING CRAB, FROZEN (NEW CLASSIFICATION, FORMERLY PART OF 0313060)			LB.
	THIS HEADING INCLUDES THE FLESH, CLAWS, TAILS AND BODIES OF KING CRAB THAT ARE NOT FURTHER PREPARED OR PRESERVED THAN BY FREEZING.			
031.3065 (1-1-68)	SHELLFISH, EXCEPT KING CRAB AND SHRIMP, FROZEN (SPECIFY BY NAME) (NEW CLASSIFICATION, FORMERLY PART OF 0313060).			LB.
	BAIT, SQUID, FROZEN CLAMS CRABS, EXCEPT KING CRAB CRAWFISH CUTTLEFISH	LOBSTERS MUSSELS OYSTERS IN THE SHELL OYSTERS, SEED OYSTERS, SHUCKED	QUAHOGS SCALLOPS SQUID	
031.3070	SHELLFISH, SALTED OR DRIED (SPECIFY BY NAME)			LB.
	SHELLFISH OF THIS CLASS REMAIN HERE EVEN IF PUT UP IN AIRTIGHT CONTAINERS.			
	CUTTLEFISH OCTOPUS POWDER, CLAM	PRAWNS SHRIMP SQUID	R WAGERIZED	

Table 20 (continued).

Schedule B number	Commodity description, and items included (List of items not necessarily complete)	Unit of quantity
	FISH, EXCEPT SHELLFISH, IN AIRTIGHT CONTAINERS, N.E.C., AND FISH PREPARATIONS, EXCLUDING SHELLFISH PREPARATIONS, WHETHER OR NOT IN AIRTIGHT CONTAINERS: (HEADING REWORDED)	
032.0110	SALMON, IN AIRTIGHT CONTAINERS	LB.
	COHO SALMON, BLUEBACK SALMON, CHINOOK SALMON, CHUM SALMON, HUMPBACK SALMON, KETA SALMON, KING SALMON, PINK SALMON, SILVER SALMON, SOCKEYE	
032.0120	MACKEREL, IN AIRTIGHT CONTAINERS	LB.
	MACKEREL, JACK	
032.0130	SARDINES	LB.
	PACKED IN CHILI SAUCE PACKED IN COTTONSEED OIL PACKED IN HERRING OIL PACKED IN MUSTARD SAUCE PACKED IN SOYBEAN OIL PACKED IN TOMATO SAUCE PILCHARDS PACKED IN OIL PILCHARDS, PICKLED SARDINES, NATURAL PACK (NO SAUCE OR OIL ADDED) SARDINES PACKED IN OLIVE OIL SARDINES, PICKLED SPRATS, PACKED IN OIL SPRATS, PICKLED	
032.0135 (1-1-68)	FISH, EXCEPT SHELLFISH, PREPARED OR PRESERVED, FROZEN (NEW CLASSIFICATION, FORMERLY PART OF 0320140)	LB.
	FISH CASSEROLES FISH DINNERS FISH PIES FISH STICKS, COOKED	
032.0145 (1-1-68)	FISH, EXCEPT SHELLFISH, PREPARED OR PRESERVED, N.E.C. (SPECIFY BY NAME) (NEW CLASSIFICATION, FORMERLY PART OF 0320140)	LB.
	ALBACORE, CANNED ALEWIVES (RIVER HERRING) ANCHOVIES, PICKLED ANTIPASTO APPETITSILD BLUEFIN, CANNED BONITO, CANNED CAVAIR COD, PICKLED COHO SIDES CUSK, PICKLED EGGS, HERRING HADDOCK, PICKLED HAKE, PICKLED HERRING, PICKLED LING, PICKLED MACKERAL, PICKLED MENHADEN, PICKLED ROE, SALMON SALMON, PICKLED SKIPJACK, CANNED STROMMING, PICKLED TORSK, PICKLED TUNA (EXCLUDING DRIED OR SMOKED), CANNED TUNA, YELLOWFIN, CANNED	
	SHELLFISH, PREPARED OR PRESERVED, EXCEPT BY FREEZING, SALTING, OR DRYING (HEADING REWORDED)	
032.0210	SHRIMP, IN AIRTIGHT CONTAINERS	LB.
	PRAWNS	
032.0220	SQUID, IN AIRTIGHT CONTAINERS	LB.
032.0225 (1-1-68)	KING CRAB, PREPARED OR PRESERVED, N.E.C. (NEW CLASSIFICATION, FORMERLY PART OF 0320230)	LB.
032.0235 (1-1-68)	SHELLFISH, EXCEPT KING CRAB, PREPARED OR PRESERVED, N.E.C. (SPECIFY BY NAME) (NEW CLASSIFICATION, FORMERLY PART OF 0320230)	LB.
	ABALONE CLAMS CRABS, EXCEPT KING CRAB (EDITED) CRAWFISH CUTTLEFISH CUTTLEFISH, PICKLED DEVIL FISH DUNGENESS (CRABS) JUICE, OYSTER LOBSTER LOBSTER, SPINY MEAT, OYSTER MUSSELS OCTOPUS OCTOPUS, PICKLED OYSTER STEW, FROZEN, CANNED OYSTERS PRAWNS, PICKLED QUAHOGS ROLLS, SHRIMP SHELLFISH CASSEROLES, FROZEN SHRIMP, CREOLE, FROZEN SHRIMP, PICKLED (OTHER THAN IN BRINE) SNAILS SQUID, PICKLED STEW, CLAM	

Conclusions: Export potential does exist for Alaskan fishery products. This is true despite the limited scope of past experience in the trade of these products. The specific fundamentals leading to this conclusion are as follows:

1. Significant export markets exist for fresh and frozen salmon, groundfish, other finfish, shrimp and other shellfish, canned salmon, canned squid, other canned shellfish and cured, salted, pickled, or dry cured fish and shellfish.

2. Virtually all trade has been with Japan and Canada.

3. World demand for fish products is expanding. This is true especially for Japan, a key Alaskan market.

4. Export potential is especially good for high quality, high value products. These have dominated Alaskan exports in the past and should continue to do so in the future.

The following tables present the dimension of past trade. Considering these and the above observations it would seem appropriate to emphasize the future of Alaskan export growth lies in selective emphasis rather than a broad based attempt to penetrate all world markets.

C. Factors affecting economic potential for each Alaska species or group - that would stimulate a market.

First, these two statements are not the same, but rather stimulating markets is a particular item relating to economic potential.

The best way to proceed is to divide these groups into the following categories.

1. a "known" vs. an "unknown" product.

2. an international as opposed to a domestic fishery.

3. a "utilized" as opposed to an underutilized resource.

All species included in (A) Established Fisheries and (B) Developing Fisheries could be associated with "known" products. In addition, though the specific species may not be known, in general sole, flounders, perch and clams have a traditional place in our markets.

What then might be the factors which could limit the economic potential of these specifics? When we look to salmon one factor dominates - future stocks available to U. S. (Alaskan) fishermen. The way to maximize this potential? - international management agreements and hatchery programs for every stream in every country involved, whenever economically feasible.

The conclusion is essentially the same for shellfish. There is no problem with consumer acceptance, given certain quality standards (which may suggest cooking shrimp on-board vessel) some form of resource management once again dominates. This is apparently

the lesson learned from our experience with King Crab. In all cases the basics of stock assessment, biology and economics must serve as the foundation for management. These must be rapidly brought into play if there is to be a Tanner Crab fishery or a Scallop fishery 10 years from now.

The Halibut fishery can show improved economic potential only through stock improvement or a more economically rational means of allocating boats to the fishery so as to not be creating considerable amounts of excess capital capacity during part of the year. This problem has been magnified by recent dramatic exvessel price increases, which will draw boats into the fishery.

For those underutilized (latent) resources other problems exist. These are tied together in a circular fashion, as follows: A latent resource exists. It is fished slightly. The resulting products have desirable organoleptic and visual characteristics. In other words, you have a product that is assured to be acceptable to the consumer although this is by comparing it to similar products now consumed and it is not based on wide distribution of the species under consideration.

So, the biologists and exploratory people assured you that the resource is plentiful, the technologists commend the product, the marketing experts express confidence about their ability to develop

markets and the economists suggest that at certain (reasonable) prices and given the suggested catch rate, fishing for these species will be profitable and encourage entry into the fishery.

But, who will take the first step? The wholesaler-retailer will agree to handle these species only if he can be guaranteed a steady supply. This way he can be assured of reaping benefits from advertising programs. The processors also will only adjust their plants to handle different species if they can be assured that this will be a lasting change. The fisherman will also be hesitant to make the investments needed to fish new resources. In other words, the individuals in each stage are waiting for all other stages to be assured before they will begin.

Under these circumstances there are only two ways that latent fisheries can be developed; either by a profit potential of such magnitude that individuals are willing to incur significant risk and initial expenses, or by a system of guarantees that minimize risk at all levels and thereby assures the development of all stages from harvesting to final consumption.

Economists in the Division of Economic Research have developed a "Price Incentive Plan for Distressed Fisheries." This is a plan designed primarily to assist industry as it enters a new fishery. Its application to underutilized resources has been

discussed by Dr. Alverson at the recent meeting of the American Fisheries Advisory Committee. The essence of this approach may be found in the Working Paper No. 14 of the Division of Economic Research. Although the one example cited therein is for certain New England species, this approach would be readily applicable for underutilized Alaskan groundfish.

The final relevant point relates to whether the resource in question is domestic or international. The issue here relates to the traditional "problems" with common property resources. In a sense, as domestic resources are available to U. S. citizens in common, international resources are even more commonly available. Management of these resources must therefore include an extra step, cooperation between involved countries, if it is to have any possibility of success. Furthermore, the increased number of potential entrants into the fishery allows for the possibility of a more rapid dissipation of whatever rent may be derived from harvesting the particular species in question, a form of economic depletion which may actually also be accompanied by physical depletion of the resource.

For international fisheries, a sole source of possible improvement would be to upgrade the quality of capital, provided that there can be some assurance of a certain share of the resource. This

suggests that a quota system of some form is a prerequisite to any rational development of international fisheries.

For domestic fisheries the problems of management are lessened only to the degree that it is not necessary to obtain the cooperation of other countries to enact rational management practices. Excessive entry may still be a problem, as demonstrated by the attractive power of the new scallop fishery and the movement to date of 16 scallop vessels from New Bedford, Massachusetts to Alaska.

The issues concerning differences in domestic vs. international fisheries, and some of the implications for management are discussed in the enclosed Working Paper No. 5 of the Division of Economic Research, "An Economic Justification for Recommended Legislative Changes in the 1964 Fishery Fleet Improvement Act." Further discussion is provided in papers by McKernan and Crutchfield, critiqued by Scott and Pontecorvo in a session entitled "The Use of the Sea Beyond National Limits" at the third annual Law of the Sea Conference, University of Rhode Island, Kingston, Rhode Island, and published in the Proceedings, pp. 255 - 293. Comments more germane to the management of Alaskan fisheries are those of Comitini in "Alaska - Japan Economic Relations," a study published by the Institute of Social, Economic and Government Research, University of Alaska (pp. 29-50).

Conclusions:

The key to the economic potential of Alaskan fisheries must therefore be the degree to which fisheries development programs are comprehensive. All of the following are critical to the development of Alaskan fisheries.

1. A management (regulatory) program.

2. A vertically comprehensive incentive program to overcome the inertia in developing latent fisheries.

3. An economic evaluation of the costs at which certain fish products may be delivered to key markets in the U. S. and to foreign countries - and the demand at these prices.

4. An evaluation of economic, social, and political legal barriers to any action deemed desirable, and the formulation of alternative institutional arrangements.

This final area is included as a new research project in the FY 1970 budget of the Bureau of Commercial Fisheries. When approved, initial research will be conducted in the Pacific Northwest. Some observations on this subject may be found in Working Paper No. 8, "Some Elements of An Evaluation of the Effects of Legal Factors on the Utilization of Fishery Resources."

D. Overall Conclusions

In many instances the conclusions reached independently in each of the preceeding sections reinforce each other either explicitly or implicitly. They contain a mixture of optimism concerning the demand for many products, pessimism concerning the problems of international fisheries management and uncertainty concerning harvesting and distributing costs and the extent of the resource base.

In ending this report our conclusions are as follows:

1. Considerable additional demand, especially for high quality, high value species, will be generated both domestically and internationally in the future. Lower valued species will meet some market resistance unless marketed in convenience form (e.g., breaded portions) and accompanied by a price incentive mechanism to accelerate simultaneous development of all facts of these underutilized species.

2. The single most important item needed to upgrade the information base used for fisheries management decisions is the development of a data bank on harvesting processing and marketing costs. Virtually all the previous conclusions in the report must be qualified due to the lack of knowledge in this area. This knowledge gap will remain a handicap until a formal data collection and analysis effort is initiated for the fisheries of Alaska.

3. For some fisheries resource limitations will dictate the future scope and magnitude of the industry. Salmon and king crab may not grow beyond their present levels, barring pathbreaking developments in aquaculture - like production techniques.

4. In this connection resource management must also play a key role. All fisheries will be subjected to some level of harvesting pressure. We are all aware of the inefficiencies of the myraid of regulatory devices already in existence. Soon to be initiated Bureau of Commercial Fisheries studies of economic, social and political barriers to efficient resource utilization will hopefully yield an optimum management structure. The success of this venture will have a significant impact on the competitive status of Alaskan fisheries.

5. In the trade of Alaska's fish products Japan and Canada will remain as crucial markets. Some other highly specialized markets may also develop for such items as shrimp as world markets begin to compete with the American consumer.

(continued from inside front cover)

14. A Price Incentive Plan for Distressed Fisheries by A. A. Sokoloski and E. W. Carlson.

15. Demand and Prices for Shrimp by D. Cleary.

16. Industry Analysis of Gulf Area Frozen Processed Shrimp and an Estimation of Its Economic Adaptability to Radiation Processing by D. Nash and M. Miller.

17. An Economic Evaluation of Columbia River Anadromous Fish Programs by J. A. Richards.

18. Economic Projections of the World Demand and Supply of Tuna, 1970 - 90 by F. Bell.

19. Economic Feasibility of a Seafood Processing Operation in the Inner City of Milwaukee by D. Cleary.

20. The 1969 Fishing Fleet Improvement Act: Some Advantages of its Passage by the Division of Economic Research.

21. An Economic Analysis of Policy Alternatives for Managing the Georges Bank Haddock Fishery by L. W. Van Meir.

22. Some Analyses of Fish Prices by F. Waugh and V. Norton.

23. Some Economic Characteristics of Pond-Raised Catfish Enterprises by J. E. Greenfield

24. Elements Crucial to the Future of Alaskan Commercial Fisheries by D. Nash, A. Sokoloski, and D. Cleary.

25. Effects on the Shrimp Processing Industry of Meeting the Requirements of Wholesome Fishery Products Legislation by D. Nash and M. Miller.

26. Benefit Cost Analysis of a Proposed Trawl Systems Program by M. Miller.

27. An Economic Analysis of Future Problems in Developing the World Tuna Resource: Recommendations for the Future Direction of the BCF Tuna Program by F. Bell.

28. Economic Efficiency in Common Property Natural Resource Use: A Case Study of the Ocean Fishery by D. W. Bromley

The goal of the Division of Economic Research is to engage in economic studies which will provide industry and government with costs, production and earnings analyses; furnish projections and forecasts of food fish and industrial fish needs for the U. S.; develop an overall plan to develop each U. S. fishery to its maximum economic potential and serve as an advisory service in evaluating alternative programs within the Bureau of Commercial Fisheries.

In the process of working towards these goals an array of written materials have been generated representing items ranging from iterim discussion papers to contract reports. These items are available to interested professionals in limited quantities of offset reproduction. These "Working Papers" are not to be construed as official BCF publications and the analytical techniques used and conclusions reached in no way represent a final policy determination endorsed by the U. S. Bureau of Commercial Fisheries.